ORIGINAL

Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C 20554

In the Matter of Amendment of the Commission's Rules to Establish Rules and Policies Pertaining to a Mobile Satellite Service in the 1610-1626.5/2483.5-2500 MHz Frequency Band	))))))	CC Docket No. 92-166

REPLY

Aeronautical Radio, Inc., by its attorneys, pursuant to Section 1.429(g) of the Commission's Rules, hereby replies to the Opposition of Motorola to ARINC's request that the FCC continue to honor its international and domestic obligations to protect an important radionavigation service from harmful and unnecessary interference from mobile units operating in the band 1610 - 1626.5 MHz.

Motorola appears to be the only licensee in the new Nongeostationary Orbit Mobile Satellite Service above 1 GHz (known as Big LEOs) to oppose ARINC's Petition for Reconsideration. Two of the four systems that would be directly affected by the need to design mobile earth terminals (METs) to protect the Russian Federation's Global Navigation Satellite System (GLONASS) -- TRW Inc. and L/Q Licensee, Inc. -- seek essentially the same relief from the Commission that ARINC and the air transport industry request.[1] If the FCC does not adopt an interim band plan to provide an adequate guardband to protect

[1] *See* Petition of TRW Inc. for Reconsideration and L/Q Licensee, Inc., Petition for Clarification, both filed in this proceeding on April 11, 1996.

GLONASS from out of band interference from the Big LEOs' METs, it will be the CDMA Big LEOs, such as TRW and L/Q, who will have to protect GLONASS, not Motorola.

ARINC and the air transport industry certainly want the Big LEOs to have a reasonable chance of success. However, United States civil aviation also requires world wide acceptance and availability of the full GNSS. It is becoming increasingly clear that the significant improvements in navigation performance in terms of increased accuracy, integrity, availability and continuity will be provided by avionics that use both GLONASS and the United States' Global Positioning System (GPS) will lead to reliance on both systems.[2] These enhanced technical performance criteria are those required for GNSS to be used for precision landings, and GNSS will be used for Category I landings before 2005, perhaps as early as 1998 or 1999. The completion of the GLONASS constellation and its acceptance by the ICAO Council earlier this year remove any doubt about the viability of GLONASS as an integral part of GNSS. The interim frequency plan originally adopted by the Commission appears to be a reasonable accommodation of the needs of the Big LEOs for spectrum while ensuring protection to GLONASS during the period between 1998 and 2005 when GLONASS will still be operating at frequencies up to 1608.8 MHz. During the early years of operation, the traffic carried by the Big LEOs will be growing, and they will not need the full amount of spectrum ultimately to be made available. Nonetheless, as long as the FCC adopts and

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[2] *See* ICAO, Report of the Second Meeting of the Global Navigation Satellite System Panel (Montreal, November 14-24, 1995) at 1A-22.

enforces out of band emission limits sufficient to protect the use of GLONASS for Category I landings throughout the period, the needs of aviation will be met.

In support of its view that the Commission should disregard its clear public interest and legal obligations to protect GLONASS from interference, Motorola argues that the final acceptance of GLONASS into the Global Navigation Satellite System (GNSS) by the Council of the International Civil Aviation Organization (ICAO) is not a new development, that the FAA has no plans to use GLONASS in the United States, and that the United States has no obligation to protect the internationally coordinated, operational radionavigation systems from harmful low earth orbiting mobile satellite systems that are currently being planned for future implementation. As shall be shown, the facts and law are otherwise.

First, the completion of the GLONASS constellation and the formal acceptance by GLONASS by the ICAO Council as part of GNSS earlier this year is clearly a new factor. At the time of the breakup of the Soviet Union, there was some concern that the Russian Federation might not be able to complete and maintain a full constellation of GLONASS satellites and might not make the service available to the world as promised by the Soviet Union. This concern has proved to be in error. As shown in ARINC's Petition for Reconsideration, in May 1995 the Russian Federation recommitted itself to providing GLONASS to the world's aviation community as part of the ICAO sponsored GNSS; in January 1996, the full GLONASS constellation became operational; and on March 14, 1996,

the ICAO Council formally accepted GLONASS as part of the GNSS.[3] This last fact is the opposite to the belief of the FCC when it adopted its MO&O in February 12, 1996,[4] and merits further consideration by the agency. Moreover, the performance of GLONASS over the past six months has been very good, increasing significantly the likelihood that GLONASS will be used for Category I landings in the United States before 2005.

Second, GLONASS will become an integral part of U.S. air navigation. As explained in ARINC's Petition for Reconsideration, one method of obtaining the accuracy, integrity, availability and continuity necessary to perform Category I, II, and III precision approaches and landings is the joint use of GPS and GLONASS with additional augmentation.[5] Although the United States is currently pursuing wide area augmentation satellites service (WAAS) to improve the precision, availability, and reliability of GPS, it is not currently clear that WAAS will be effectively implemented, and if so, whether it will deliver the kind of performance that is required to support the landing of aircraft. Studies indicate that a combination of GPS and GLONASS perhaps with additional augmentation can achieve improved performance. Combined GLONASS/GPS avionics are currently being designed by Rockwell Collins, and companies such as Ashtech, Diamler-Benz, and 3S Navigation have already demonstrated combined GLONASS/GPS receivers.

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[3] *See* ARINC Petition for Reconsideration at 5-6 and Att. The Federal Radionavigation Plan recognizes that the Department of Transportation is investigating combined GPS/GLONASS receivers. DOT/DOD, 1994 Federal Radionavigation Plan at 4-3.

[4] *See* MO&O at ¶ 14.

[5] *See* ARINC Petition for Reconsideration at 7.

Third, Motorola also argues that there is no international obligation to protect GLONASS, citing to changes to ITU RR S5.364 (formerly 731E) at WRC 1995 that might lessen the obligations of the Big LEOs to protect radionavigation satellite systems. ITU RR S5.364 (731E) applies to the band 1610 - 1626.5 MHz. GLONASS will be operating below 1610 MHz starting in 1998. ITU RR S4.5 (343) and RR S4.10 (953) -- completely ignored by Motorola -- address protection of the radionavigation-satellite service in the 1559 - 1610 MHz band. ITU RR S4.5 (343) requires that a frequency assignment shall be separated from the limits of allocated band in much a way that no harmful interference is caused to services in the adjoining band. The interim frequency plan meets this requirement to protect operations in the radionavigation band immediately below 1610 MHz. ITU RR S4.10 (953) also requires the FCC to take "special measures to ensure . . . freedom from harmful interference" to "radionavigation and other safety services." GLONASS below 1610 MHz is fully coordinated through the ITU process, and has priority and must be protected from interference from subsequent systems.

Motorola also mischaracterizes our obligations under the Convention on International Civil Aviation (the Chicago Convention). Once SARPs are adopted, the United States must comply with the SARPs or notify ICAO of the exception. The United States has not submitted such a notice to ICAO on GNSS and there is no indication that it will. Indeed, the United States, as a principal architect of GNSS, would be hard put to file an exception to the international GNSS SARPS because the United States has supported GLONASS for GNSS over a period of several years in its support of ICAO. Special Committee on Future Air

Navigation Systems (FANS) and ICAO Documents 9524 (FANS/4) and 9623 (FANS(II)/4), both of which clearly advocated that GLONASS be a part of GNSS. An exception by the United States would make it difficult to achieve the needed international consensus on GNSS and could result in retaliation by other countries in refusing to accept GPS as a means of navigation in their airspace.

Motorola is correct that the Federal Aviation Administration (FAA) must certify the use of GLONASS before it can be used for approaches and landings in the United States. Motorola asserts that the failure of the FAA unequivocally to commit to certify GLONASS means that GLONASS is unlikely to be used. As ARINC demonstrated in its Petition, everything that can be done today is being done to establish MOPS in RTCA and to get to a position where use of GLONASS can be certified by the FAA. RTCA, Inc., is currently developing MOPS for non-precision approaches and precision approach MOPS are expected by the end of 1997. At that time, the FAA will be in a position to approve procedures and certify equipment for Category I landings using GLONASS with GPS and other forms of local or wide area augmentation. Viewed from the perspective of civil aviation virtually the only event that might derail this process is excessive interference from Big LEO METs. Failure of the FCC to protect GLONASS could make the system unusable by aviation for instrument approaches and landings. This would be a self-fulfilling prophecy.

RTCA SC-159 is currently working on technical requirements for protection of GPS and GLONASS. Studies submitted by the FAA demonstrate the need for adequate guardbands and/or stringent emission masks to protect GLONASS from harmful interference

from Big LEO METs.[6] Using those data, clearly the measured out of band emissions from proposed Big LEO METs will cause harmful interference to GLONASS even after 2005. The METs units will still produce out of band power that is 16 dB too high into GLONASS. Receivers. These MSS terminals will require a 5 MHz shift up in frequency to protect GLONASS.

The United States is the world's leader in both communications and aviation. Aviation's GNSS and the Big LEOs need worldwide acceptance to fulfill their promises. The international regulations and institutions largely reflect the work of the United States. The United States must live up to its international obligations in order to continue to achieve the global consensus needed for these systems.

The FCC and the Big LEOs have to recognize their legal obligations to protect GLONASS and GPS as part of the world wide GNSS. GPS and GLONASS are currently operational systems in which aviation has invested heavily in order to use. The Russian Federation has been willing to work with the Big LEOs to accommodate their operations, but cooperation must be a two-way street. The Big LEOs are still designing their systems and can modify their hardware and/or frequency plans to live within reasonable parameters for sharing, which include protection of GLONASS from interference during Category I

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[6] *See* R. Frazier (FAA), R. Kelly (FAA consultant), & R. Erlandson (Collins Radio), The Aviation Perspective on MSS Out-of-Band Emission in the GNSS Band (May 29-30, 1996).

landings. The FCC should restore the interim frequency plan and reaffirm its commitment to protect GLONASS from out of band emissions from Big LEO METs.

Respectfully submitted,

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May 31, 1996

CERTIFICATE OF SERVICE

I hereby certify that on this 31st day of May, 1996, I caused copies of the foregoing "Reply" of Aeronautical Radio, Inc., in CC Docket No. 92-166 to be mailed via first-class, postage prepaid, to the following:

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